BaseSpace® Analysis Environment

Genomics cloud computing for biologists.

BaseSpace Highlights

- **Real-Time Data Upload and Run Monitoring**
  View run progress as data uploads to the secure data repository, and begin analysis immediately after run completes
- **One-Click Access to the Latest Bioinformatics Tools**
  Easily access and launch a growing collection of bioinformatics tools with BaseSpace Apps
- **Collaboration and Data Sharing on a Global Scale**
  Configurable options to disseminate your data to peers, create working groups, or engage the scientific community

Introduction

Next-generation sequencing data has revolutionized the way and rate at which biomedical research is conducted. However, data has traditionally been stored at customer sites with little uniformity and often rigorous policies for installing and managing third-party software. BaseSpace is the first genomic cloud computing platform designed to bring simplified data management and analytical sequencing tools directly to research biologists, significantly expanding what you can do with your sequencing data (Figure 1).

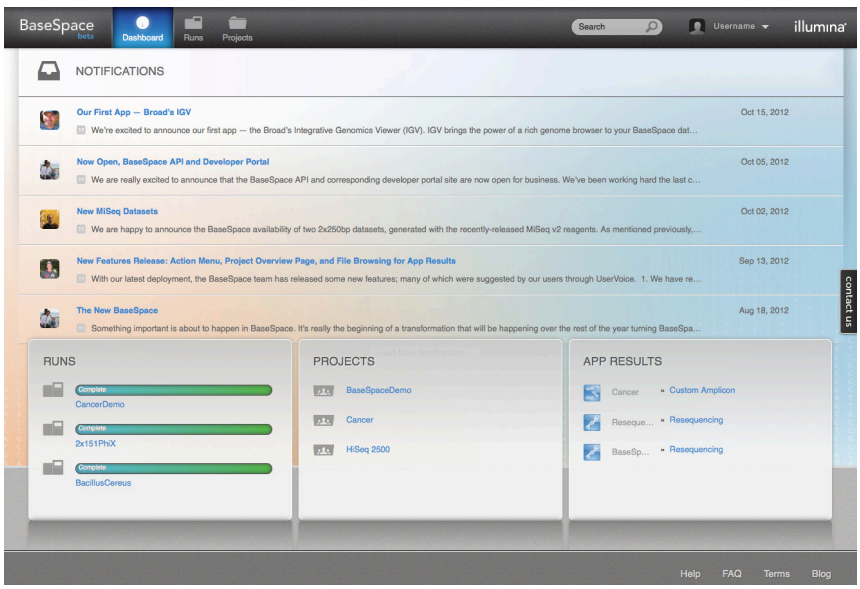
Bioinformatics Infrastructure for Biologists

Labs pursuing next-generation sequencing traditionally required the services of a highly trained bioinformatician and dedicated infrastructure to perform data management, analysis, and storage. BaseSpace helps automate bioinformatic analysis using cloud-based software applications, and scalable, secure storage that grows with your research needs, starting with 1 TB of free storage. Designed with the biologist in mind, BaseSpace's push-button bioinformatics applications are simple to use and produce biologically relevant results from raw data. BaseSpace output files are industry standards, and use open formats such as bam (mapped and aligned), vcf (variants called), fastq (raw reads), and text formats, which can be imported into your favorite scientific software tools for further analysis. Everything you need is in one place.

Real Time Monitoring- From Anywhere

BaseSpace is the first cloud platform to be directly integrated into Illumina's industry-leading sequencing platforms. During a run, you can monitor data by lane or by cycle, and view quality performance metrics from any mobile device (Figure 2). Data is seamlessly pushed to BaseSpace for automatic analysis and storage minutes after a run is completed, with the option of retaining data for local hosting and analysis on the instrument.

Figure 1: BaseSpace Dashboard



The intuitive BaseSpace dashboard:
Runs panel provides a quick glance at the real-time status of your sequencing runs, including data from Sequence Analysis Viewer (SAV).
Projects panel is completely configurable and shows your samples and app results, defined by the sample sheet.
App Results panel shows reports, variant lists, annotation, metadata, and other data within Projects.
Notifications panel shows your account, including updates on run status, invitations to share datasets, accepted invitations, new features, and Apps.

Figure 2: Monitor Run Data in Real Time

The Sequence Analysis Viewer (SAV) capabilities are now built into the BaseSpace user interface, allowing real-time, cycle-by-cycle monitoring. The Charts view shows data by lane and by cycle, with Q-Score distribution and heatmap features. Each graph can be expanded to full size.

Data Analysis Tools at Your Fingertips

Automated, Streamlined Applications Workflows

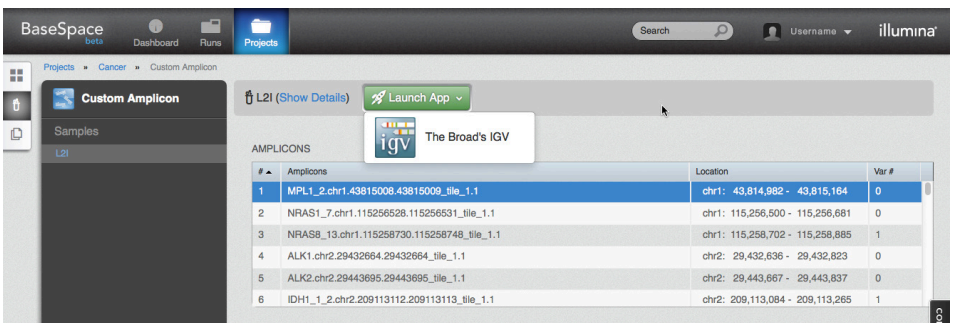
BaseSpace currently offers six integrated data analysis workflows: resequencing, amplicon resequencing, 16S metagenomics, *de novo* assembly (powered by Velvet), small RNA, and library QC. Using the Illumina Experiment Manager, the desired analysis is selected during sample sheet setup, and data is streamed directly to BaseSpace as the run commences. Upon completion of the sequencing run, BaseSpace automatically initiates the selected analysis without user intervention. The analysis is completed in a few hours, and a report is automatically generated.

BaseSpace Apps, the Right Tools for the Job

From visualization and graphical genome browsing, to annotation and filtering, to gene expression analysis, BaseSpace Apps provides an analysis ecosystem where you can pair your data with algorithms and methods developed by a growing community of bioinformatics software developers (Figure 3). With the BaseSpace Apps store, your data is just a click away from the latest analysis tools

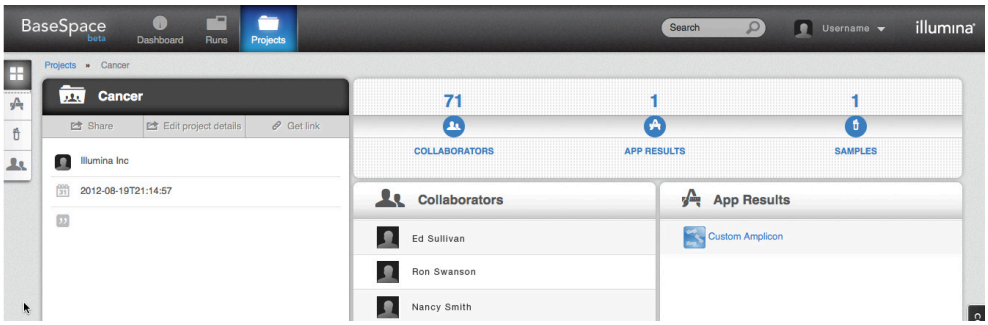
BaseSpace also greatly simplifies third-party software development by creating a robust platform-as-a-service specific to the needs of next-generation sequencing data, and creates a channel for the access, distribution, and sharing of third-party tools. This model enables new applications to reach the widest possible user base in the shortest amount of time.

Figure 3: Launch the Latest Analysis Tools On-Demand



Browse and explore the latest apps from the bioinformatics community in the BaseSpace Apps Store, and launch them with a single click right from your dataset. Shown is Broad's Interactive Genome Viewer (IGV).

Figure 4: Built for Collaboration



Flexible collaboration tools make it simple to keep track of who has shared your data, and expand your circle of collaborators.

Collaboration on a Global Scale

With your raw and summarized data in the cloud, BaseSpace users can instantly share data with partners across the hallway or across the globe (Figure 4). Shareable links can be easily created and emailed to anyone in the world, giving your collaborators instant access to your results and to the sequencing runs that created them. Equally suited for passing data between members of a lab or between members of an international consortium, BaseSpace makes big data portable and accessible to the people who need it most.

Enhanced Security

Security is of paramount importance when making the decision to move genomic data to cloud-based analysis and storage. Your data is protected through a number of physical, electronic, and administrative measures. Data for upload are encrypted using the AES256 standard and protected by SSL. Your data within BaseSpace is hosted on Amazon Web Services (AWS), which is compliant with a wide variety of industry-accepted security standards[1]. Amazon's comprehensive and industry tested approach to platform security ensures that BaseSpace meets or exceeds the security demands of most institutional infrastructures.

Get Started Today

Go to basespace.illumina.com to sign up for your free BaseSpace account.

References

1. http://aws.amazon.com/security

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